

I Claim:

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1. An electromagnetic antenna apparatus; the apparatus exhibiting a generally continuous signal response between a first frequency and a second frequency; the apparatus exhibiting a deviation from said signal response in a frequency region centered substantially at a selected frequency between said first frequency and said second frequency; the apparatus comprising:
 - 6 (a) an antenna transceiving element;
 - 7 (b) a feed structure; said feed structure being coupled with said antenna receiving
 - 8 element for communicating transceiving signals with said antenna transceiving
 - 9 element; and
 - 10 (c) a discontinuity structure in said antenna transceiving element; said discontinuity
 - 11 structure being coupled with said feed structure; said discontinuity structure being
 - 12 configured for effecting return of selected said transceiving signals to said feed
 - 13 structure as return signals; said return signals effecting said deviation.
 - 1 2. An electromagnetic antenna apparatus as recited in Claim 1 wherein said antenna transceiving element has a polygonal shape defined by a periphery; said discontinuity structure including a first deviation structure interrupting said periphery at a first deviation locus displaced a first peripheral distance in a first direction along said periphery from said feed structure; said first deviation structure extending to a first return distance from said first deviation locus toward said feed structure; said first return distance being sufficient to establish signal coupling between said first deviation structure and said feed structure.
 - 1 3. An electromagnetic antenna apparatus as recited in Claim 2 wherein said selected frequency has a selected wavelength and wherein said first peripheral distance plus said first return distance substantially approximates one-half said selected wavelength.

- 1 4. An electromagnetic antenna apparatus as recited in Claim 2 wherein said
2 discontinuity structure further includes a second deviation structure interrupting said
3 periphery at a second deviation locus displaced a second peripheral distance in a
4 second direction along said periphery from said feed structure; said second deviation
5 structure extending to a second return distance from said second deviation locus
6 toward said feed structure; said second return distance being sufficient to establish
7 signal coupling between said second deviation structure and said feed structure.

- 1 5. An electromagnetic antenna apparatus as recited in Claim 4 wherein said selected
2 frequency has a selected wavelength and wherein said second peripheral distance plus
3 said second return distance substantially approximates one-half said selected
4 wavelength.

- 1 6. An electromagnetic antenna apparatus as recited in Claim 1 wherein said antenna
2 transceiving element has a substantially elliptical shape defined by a periphery having
3 a peripheral length; said elliptical shape being oriented substantially symmetrically
4 with respect to a major axis and a minor axis perpendicular with said major axis; said
5 discontinuity structure including a material-free zone within said periphery; said
6 material-free zone being delineated by a first border having a first edge length and a
7 second border having a second edge length greater than said first edge length and less
8 than said peripheral length; said first border and said second border meeting at a pair
9 of termini; each terminus of said pair of termini being situated sufficiently near said
10 feed structure to establish signal coupling between said deviation structure and said
11 feed region.

- 1 7. An electromagnetic antenna apparatus as recited in Claim 6 wherein said frequency
2 region is bounded by a lower frequency having a longer wavelength and by a higher
3 frequency having a shorter wavelength; and wherein said first edge length
4 approximates one-half said shorter wavelength and said second edge length
5 approximates one-half said longer wavelength.

1 8. An electromagnetic antenna apparatus; the apparatus exhibiting a generally
2 continuous signal response between a first frequency and a second frequency; the
3 apparatus exhibiting a deviation from said signal response in a frequency region
4 centered substantially at a selected frequency between said first frequency and said
5 second frequency; the apparatus comprising:
6 (a) at least one antenna transceiving element;
7 (b) a feed structure for each respective antenna transceiving element of said at least
8 one antenna transceiving element; transceiving signals being communicated with
9 each said respective antenna transceiving element via a respective said feed
10 structure;
11 (c) a discontinuity structure in at least one selected antenna transceiving element of
12 said respective antenna transceiving element; said discontinuity structure being
13 coupled with said respective feed structure for said at least one selected antenna
14 transceiving element; said discontinuity structure being configured for effecting
15 return of selected said transceiving signals to said respective feed structure as
16 return signals; said return signals effecting said deviation.

1 9. An electromagnetic antenna apparatus as recited in Claim 8 wherein said at least one
2 selected antenna transceiving element has a polygonal shape defined by a periphery;
3 said discontinuity structure including a first deviation structure interrupting said
4 periphery at a first deviation locus displaced a first peripheral distance in a first
5 direction along said periphery from said respective feed structure; said first deviation
6 structure extending to a first return distance from said first deviation locus toward
7 said respective feed structure; said first return distance being sufficient to establish
8 signal coupling between said first deviation structure and said respective feed
9 structure.

1 10. An electromagnetic antenna apparatus as recited in Claim 9 wherein said selected
2 frequency has a selected wavelength and wherein said first peripheral distance plus

3 said first return distance substantially approximates one-half said selected
4 wavelength.

1 11. An electromagnetic antenna apparatus as recited in Claim 9 wherein said
2 discontinuity structure further includes a second deviation structure interrupting said
3 periphery at a second deviation locus displaced a second peripheral distance in a
4 second direction along said periphery from said respective feed structure; said second
5 deviation structure extending to a second return distance from said second deviation
6 locus toward said respective feed structure; said second return distance being
7 sufficient to establish signal coupling between said second deviation structure and
8 said respective feed structure.

1 12. An electromagnetic antenna apparatus as recited in Claim 11 wherein said selected
2 frequency has a selected wavelength and wherein said second peripheral distance plus
3 said second return distance substantially approximates one-half said selected
4 wavelength.

1 13. An electromagnetic antenna apparatus as recited in Claim 8 wherein said at least one
2 selected antenna transceiving element has a substantially elliptical shape defined by a
3 periphery having a peripheral length; said elliptical shape being oriented substantially
4 symmetrically with respect to a major axis and a minor axis perpendicular with said
5 major axis; said discontinuity structure including a material-free zone within said
6 periphery; said material-free zone being delineated by a first border having a first
7 edge length and a second border having a second edge length greater than said first
8 edge length and less than said peripheral length; said first border and said second
9 border meeting at a pair of termini; each terminus of said pair of termini being
10 situated sufficiently near said respective feed structure to establish signal coupling
11 between said deviation structure and said respective feed region.

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1 14. An electromagnetic antenna apparatus as recited in Claim 13 wherein said frequency
2 region is bounded by a lower frequency having a longer wavelength and by a higher
3 frequency having a shorter wavelength; and wherein said first edge length
4 approximates one-half said shorter wavelength and said second edge length
5 approximates one-half said longer wavelength.

1 15. An antenna apparatus for transceiving electromagnetic signals, the apparatus
2 exhibiting a generally continuous signal response between a first frequency and a
3 second frequency; the apparatus exhibiting a deviation from said signal response in at
4 least one frequency region; each respective frequency region of said at least one
5 frequency region being centered substantially at a respective selected frequency
6 between said first frequency and said second frequency; the apparatus comprising:
7 (a) at least one transceiving element;
8 (b) at least one feed structure; each respective said at least one transceiving element
9 transferring said electromagnetic signals via a respective feed structure of said at
10 least one feed structure;
11 (c) at least one selected transceiving element of said at least one transceiving element
12 including a discontinuity structure; said discontinuity structure being coupled with
13 said respective feed structure for effecting return of selected said transceiving
14 signals to said respective feed structure as return signals; said return signals
15 effecting said deviation.

1 16. An antenna apparatus for transceiving electromagnetic signals as recited in Claim 15
2 wherein said at least one selected transceiving element has a polygonal shape defined
3 by a periphery; said polygonal shape being generally symmetric about an axis; said
4 axis intersecting said respective feed structure; said discontinuity structure comprising
5 a plurality of material free zones in said polygonal shape; said plurality of material
6 free zones being arranged substantially symmetrically with respect to said axis; each
7 respective material free zone interrupting said periphery at a respective deviation
8 locus displaced a respective deviation distance along said periphery from said

9 respective feed structure; each said respective material free zone extending a
10 respective return distance from said respective deviation locus toward said respective
11 feed structure; said respective return distance being sufficient to establish signal
12 coupling between said respective deviation structure and said respective feed
13 structure.

1 17. An antenna apparatus for transceiving electromagnetic signals as recited in Claim 16
2 wherein each said respective selected frequency has a respective selected wavelength
3 and wherein said respective peripheral distance plus said respective return distance
4 substantially approximates one-half of a respective selected wavelength.

1 18. An antenna apparatus for transceiving electromagnetic signals as recited in Claim 15
2 wherein said at least one selected antenna transceiving element has a substantially
3 elliptical shape defined by a periphery having a peripheral length; said elliptical shape
4 being oriented substantially symmetrically with respect to a major axis and a minor
5 axis perpendicular with said major axis; said discontinuity structure including a
6 material-free zone within said periphery; said material-free zone being bounded by a
7 first border having a first edge length and a second border having a second edge
8 length; said second edge length being greater than said first edge length and less than
9 said peripheral length; said first border and said second border meeting at a pair of
10 termini; each terminus of said pair of termini being situated sufficiently near said
11 respective feed structure to establish signal coupling between said deviation structure
12 and said respective feed region.

1 19. An electromagnetic antenna apparatus as recited in Claim 18 wherein said frequency
2 region is bounded by a lower frequency having a longer wavelength and by a higher
3 frequency having a shorter wavelength; and wherein said first edge length
4 approximates one-half said shorter wavelength and said second edge length
5 approximates one-half said longer wavelength.